AMENDMENTS TO THE CLAIMS

The following listing of claims will replace all prior versions and listings of claims in the application.

LISTING OF CLAIMS

1-19. (Cancelled)

20. (Currently Amended) A method for producing an *in-situ* composite solder having an intermetallic component, comprising the steps of:

(a) providing a mixture comprising the components of a eutectic or near-eutectic matrix solder and the components of an intermetallic component present at greater than or equal to about 10 volume % and less than or equal to about 95 volume %, wherein said intermetallic component is selected to have a density within 10% of a density of said eutectic or near-eutectic matrix solder;

(b) heating said mixture so as to melt all components of said mixture forming a non-solid mixture; and

(c) cooling said non-solid mixture at a rate sufficiently fast so as to form said intermetallic components having a particle size of less than about 10 microns, wherein said intermetallic components are homogenously distributed throughout said matrix solder to form the composite solder.

21. (Previously Presented) A method of Claim 20, wherein said intermetallic component comprises a transition metal.

22. (Previously Presented) A method of Claim 21, wherein said intermetallic component comprises a first row transition metal.

23. (Previously Presented) A method of Claim 22, wherein said intermetallic component comprises a metal selected from the group consisting of nickel, iron, copper, and mixtures thereof.

24. (Previously Presented) A method of Claim 23, wherein said intermetallic component comprises Cu_6Sn_5.

25. (Previously Presented) A method of Claim 23, wherein said intermetallic component comprises Ni_3Sn_4.

26. (Previously Presented) A method of Claim 23, wherein said intermetallic component comprises $FeSn_2$.

27. (Previously Presented) A method of Claim 21, wherein said intermetallic component comprises a metal which is a component of said matrix solder.

28. (Previously Presented) A method of Claim 20, wherein said matrix solder is a lead-free eutectic or near-eutectic solder.

29. (Previously Presented) A method of Claim 28, wherein said matrix solder is a binary or ternary solder.

30. (Previously Presented) A method of Claim 29, wherein said matrix solder is 96.5 Sn/3.5 Ag.

31. (Previously Presented) A method according to Claim 20, wherein said intermetallic components are less than 5 microns in size.

32. (Previously Presented) A method according to Claim 31, wherein intermetallic components having a particle size of less than about 5 microns are homogenously distributed throughout said matrix solder.

33. (Previously Presented) A method according to Claim 32, wherein intermetallic components having a particle size of less than about 2 microns are homogenously distributed throughout said matrix solder.

34. (Previously Presented) A method according to Claim 20, wherein said intermetallic component comprises from about 10% to about 20% by volume of said composite solder.

35. (Previously Presented) A method of Claim 34, wherein said intermetallic component comprises about 20% by volume of said composite solder.

36. (Previously Presented) A method according to Claim 20, additionally comprising, after said heating step (b) and prior to said cooling step (c), the steps of cooling said mixture to form a solid, and remelting said solid at a temperature sufficient to melt all components of said solid.

37. (Previously Presented) A method according to Claim 20, wherein said cooling is at a rate of at least about 100° C/second.

38. (Previously Presented) A method of Claim 20, wherein said cooling step comprises cooling by spat quenching, spray atomization, or by continuous casting into a solid form.

39. (Previously Presented) A method for producing an *in-situ* composite solder having an intermetallic component, comprising the steps of:

(a) providing a mixture comprising the components of a matrix solder and the components of said intermetallic component in amounts appropriate to form a solder having from about 10% to about 40% by volume of said intermetallic component, wherein said intermetallic component is selected to have a density within 10% of a density of said matrix solder;

(b) heating said mixture so as to melt all components of said mixture forming a non-solid mixture; and

(c) cooling said non-solid mixture at a rate sufficiently fast so as to form a composite solder wherein intermetallic components having a particle size of less than about 10 microns are homogenously distributed throughout said matrix solder.

40. (Previously Presented) A method of Claim 39, wherein said intermetallic component comprises a first row transition metal.

41. (Previously Presented) A method of Claim 40, wherein said intermetallic component comprises a metal selected from the group consisting of nickel, iron, copper, and mixtures thereof.

42. (Previously Presented) A method of Claim 41, wherein said intermetallic component comprises a compound selected from the group consisting of Cu_6Sn_5, Ni_3Sn_4, $FeSn_2$, and mixtures thereof.

43. (Previously Presented) A method of Claim 40, wherein said intermetallic component additionally comprises a metal which is a component of said matrix solder.

44. (Previously Presented) A method of Claim 39, wherein said matrix solder is a eutectic or near-eutectic binary or ternary solder.

45. (Previously Presented) A method of Claim 44, wherein said matrix solder is 96.5 Sn/3.5 Ag.

46. (Previously Presented) A method of Claim 39, wherein said cooling step comprises cooling by spat quenching, spray atomization, or by continuous casting into a solid form.

47. (Previously Presented) A method according to Claim 39, wherein said solder is lead-free.

48. (Previously Presented) A method according to Claim 39, wherein said intermetallic components are less than 5 microns in size.

49. (Previously Presented) A method according to Claim 48, wherein intermetallic components having a particle size of less than about 5 microns are homogenously distributed throughout said matrix solder.

50. (Previously Presented) A method according to Claim 49, wherein intermetallic components having a particle size of less than about 2 microns are homogenously distributed throughout said matrix solder.

51. (Previously Presented) A method according to Claim 39, wherein said intermetallic component comprises from about 10% to about 20% by volume of said composite solder.

52. (Previously Presented) A method according to Claim 39, wherein said cooling is at a rate of at least about 100° C/second.

53. (Previously Presented) A method according to Claim 39, additionally comprising, after said heating step (b) and prior to said cooling step (c), the steps of cooling said mixture to form a solid, and remelting said solid at a temperature sufficient to melt all components of said solid.

54. (Previously Presented) A method for producing an *in-situ* composite solder having an intermetallic component, comprising the steps of:

(a) providing a binary or ternary eutectic or near eutectic matrix solder;

(b) heating a mixture of said matrix solder with the components of an intermetallic component comprising a first row transition metal, at a temperature greater than the highest melting temperature of all of the individual components of said mixture so as to form a non-solid mixture;

(c) rapidly cooling said non-solid mixture; wherein said composite solder comprises from about 10% to about 40% by volume of said intermetallic component, said intermetallic component comprises at least one element present in said matrix solder; said intermetallic component comprises particles having a particle size of less than about 10 microns homogenously distributed throughout said composite solder, and said intermetallic component is selected to have a density within 10% of a density of said matrix solder;

(d) heating said composite solder to a temperature that is greater than a melting point of said matrix solder and less than a melting point of said intermetallic component, wherein said heating melts only said matrix solder; and

(e) cooling and solidifying said composite solder to form a solder joint, wherein said composite solder has a greater solder joint strength, creep resistance, and fatigue resistance than a comparative solder joint formed from a eutectic or near-eutectic solder.

55. (Previously Presented) A method of Claim 54, wherein said particle size is less than 5 microns.

56. (Previously Presented) A method of Claim 54, wherein said particle size is less than 2 microns.

57. (Previously Presented) A method of Claim 54, wherein said intermetallic component comprises a metal selected from the group consisting of nickel, iron, copper, and mixtures thereof.

58. (Previously Presented) A method of Claim 57, wherein said intermetallic component comprises a compound selected from the group consisting of Cu_6Sn_5, Ni_3Sn_4, $FeSn_2$, and mixtures thereof.

59. (Previously Presented) A method of Claim 58, wherein said matrix solder is 96.5 Sn/3.5 Ag.

60. (Previously Presented) A method of Claim 54, wherein said intermetallic particles comprises about 10% to about 20% by volume of said composite solder.

61. (Previously Presented) A method of Claim 54, wherein said cooling step comprises cooling by splat quenching, spray atomization, or by continuous casting into a sold form.

62. (Previously Presented) A method according to Claim 54, additionally comprising, after said heating step (b) and prior to said cooling step (c), the steps of cooling said mixture to form a solid, and remelting said solid at a temperature sufficient to melt all components of said solid.